

## CHECKLIST AND HOST PLANTS OF THE TREEHOPPERS (HEMIPTERA: MEMBRACIDAE) OF NORTH CAROLINA

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**Abstract.**—Based on recent collecting and an examination of museum specimens, at least 89 treehopper species (Hemiptera: Membracidae) occur in North Carolina, of which 26 species represent new state records. The presence of 13 species previously recorded from North Carolina could not be verified based on available material. Three previous North Carolina records were found to be based on misidentifications. The known distribution (by county) and host plants in North Carolina are given for each species. Photographs of representative taxa and a host plant index are included. *Stictocephala bisonia* Kopp and Yonke is reinstated as a valid name (and not a junior synonym of *Ceresa alta* Walker).

**Key Words:** Membracidae, treehopper, taxonomy, biogeography, insect-plant interactions

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The family Membracidae (Figs. 1–10) includes more than 3,000 described treehopper species worldwide (McKamey 1998). About 260 are known to occur in temperate North America. Many of these species are restricted to the mixed hardwood forests and savannas of the eastern United States, where they exploit a variety of woody and herbaceous plants as hosts for oviposition, feeding, or both. Most North American treehopper species are univoltine, solitary, and cryptic as both immatures and adults, and, hence are seldom noticed or collected. A few species, however, are multivoltine, gregarious (Figs. 7, 8), ant-mutualistic (Figs. 8, 10), or aposematic (Fig. 7), and are therefore somewhat conspicuous. Three kinds of life cycles are common among North American treehoppers (Table 1). Many members of category III that feed and oviposit on oaks (Figs. 5, 8) are usually found as adults for only a few weeks in May or June, depending on the location within the state.

Records of North Carolina treehoppers were summarized by Metcalf (1915), Brimley (1938, 1942), Wray (1950, 1967), Metcalf and Wade (1965), and Kopp and Yonke (1973a–c, 1974: distribution maps). Kopp and Yonke's series provided keys to many species in eastern North America. Deitz et al. (1976), McGiffen and Neunzig (1985), and Hargrove (1986) gave further records of North Carolina treehoppers associated with soybeans, grapes, and black locust, respectively.

The objectives of the present work were to document the species richness of North Carolina treehoppers, summarize the known distributions (Fig. 11: county map) and host plant associations within the state, and provide an up-to-date checklist following current nomenclature. Although host records for numerous species have been published (e.g., Funkhouser 1917; Ball 1931; Kopp and Yonke 1973a–c, 1974), the extent to



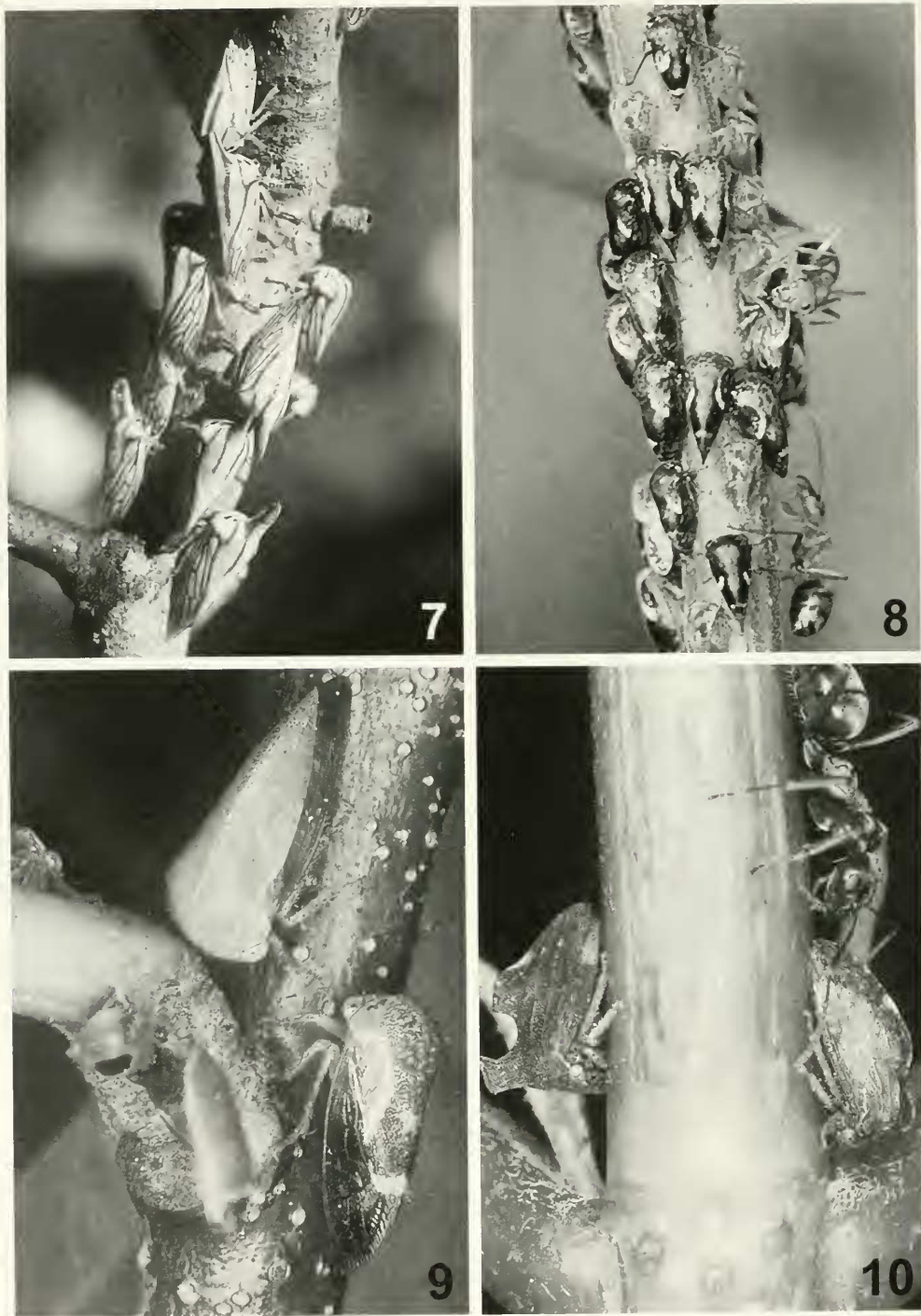
Figs. 1–6. Representative treehoppers of North Carolina. 1, *Microcentrus caryae*. 2, *Acutalis tartarea*. 3, *Micrutalis calva*. 4, *Campylenchia latipes*. 5, *Glossonotus univittatus*. 6, *Stictocephala militaris*.

which host associations vary geographically is poorly documented and most published records have not been verified through rearing of immatures.

#### MATERIALS AND METHODS

The species records below are based on specimens in the following collections: the North Carolina State University Insect Collection, Raleigh [NCSU; includes recent material from the authors]; Mark J. Roths-

child Collection, % Maryland Department of Agriculture, Salisbury [MJRC]; Florida State Collection of Arthropods, Gainesville [FSCA]; North Carolina Department of Agriculture, Raleigh [NCDA]; and the National Museum of Natural History, Smithsonian Institution, Washington, D.C. [USNM]. C. S. Brimley's historically important material is housed at the collections of NCDA (specimens and card files) and NCSU (specimens).



Figs. 7-10. Representative treehoppers of North Carolina (continued). 7, *Platycotis vittata*, aggregation of teneral adults. 8, *Vanduzeeia arquata*, aggregation of adults and nymphs attended by ants. 9, *Ophiderma evelyna*: left, female (green), right, male (brown). 10, *Eutylia carinata* (left) and *Publilia concava* (right, attended by ant).

Table 1. Three major kinds of life cycles in treehoppers of eastern North America (modified from Kopp and Yonke 1973a).

| Category: Taxa                                                                                                              | Overwintering                                            | Development                                                                                                       | Generations Per Year    |
|-----------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|-------------------------|
| I: Polyglyptini, <i>Platycotis vittata</i> , probably <i>Cam-pylenchia latipes</i> , some <i>Vanduzee</i> and some Ceresini | adults overwinter in litter                              | nymphs feed and develop on herbaceous or woody host plants                                                        | 2 (most are bivoltine)  |
| II: Acutalini, most Ceresini, some <i>Micrutalis</i>                                                                        | eggs overwinter under bark in young twigs of woody hosts | nymphs feed and develop on herbaceous host plants (many females require preoviposition period before laying eggs) | 1 (univoltine)          |
| III: Smiliini, <i>Microcentrus</i> spp., <i>Enchenopa binota</i> -complex, some <i>Mi-crutalis</i>                          | eggs overwinter under bark in young twigs of woody hosts | nymphs feed and develop on same woody hosts used for oviposition                                                  | 1 (most are univoltine) |

Records are based on adult specimens except as noted. Among species of Ceresini, males are generally required for positive identification (Kopp and Yonke 1979); consequently, females without associated males often could not be identified. Each entry includes a list of counties in North Carolina from which the species has been recorded, the seasonal distribution (earliest and latest calendar date of collection of adults), and North Carolina host records. A few specimens bore labels indicating a locality situated on the border of two or three counties; these were considered to occur in all of the counties involved.

Except as noted, only North Carolina host associations based on specimens examined are reported here. Hosts marked with an asterisk (\*) are those from which both nymphs and adults have been collected. Other plants listed are those from which only adults have been collected, so some may not be true hosts. Botanical nomenclature follows Kartesz (1994), Liberty Hyde Bailey Hortorium (1976), and Radford et al. (1968). To conserve space, botanical common names and the authors of plant scientific names are given only in the alphabetical host index.

To facilitate comparisons with *The In-*

*sects of North Carolina* (Brimley 1938, 1942, Wray 1950, 1967), and *The Treehoppers of Missouri* (Kopp and Yonke 1973a-c, 1974), names from those works that differ from current nomenclature are given for each entry in square brackets (occasionally with other notes on synonymy). For additional synonymy, see Fascicle 1, Membracidae, and its supplements, in the *General Catalogue of the Hemiptera* (Funkhouser 1927, Metcalf and Wade 1965, McKamey 1998) and the associated bibliographies (Metcalf and Wade 1963, Deitz and Kopp 1987, Deitz 1989).

For convenience, the checklist is arranged alphabetically by genus and species. Table 2 summarizes the placement of the included genera into tribes and subfamilies.

RESULTS

Recent collecting in North Carolina yielded numerous new state, county, and host records. Figure 11 indicates the number of treehopper species recorded for each of North Carolina's 100 counties. The higher species richness recorded near Raleigh (Wake County, 68 species), Asheville (Buncombe County, 39 species), Boone (Watauga county, 30 species), and Charlotte

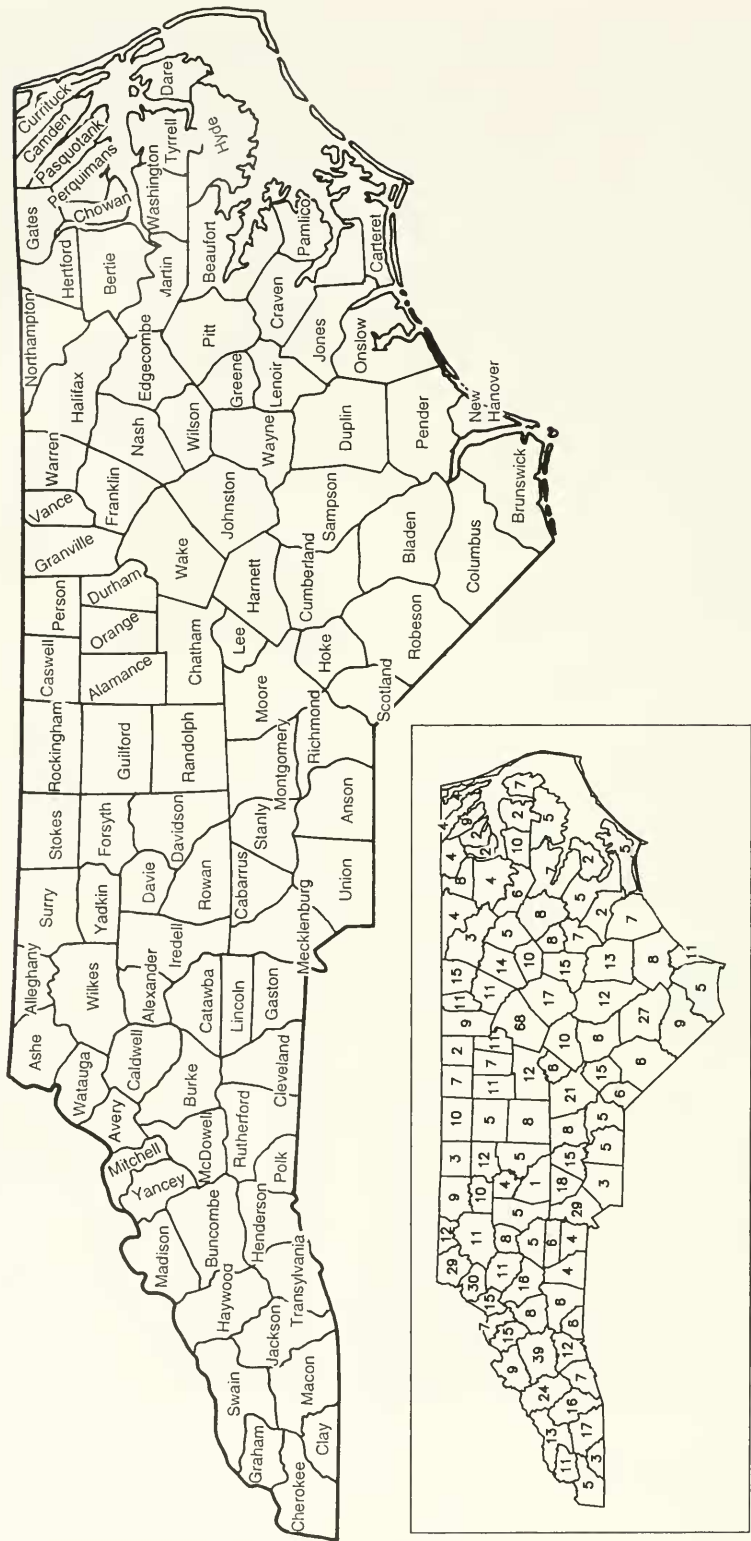


Fig. 11. North Carolina map with number of treehopper species recorded from each county.

Table 2. Summary of the classification of North Carolina Membracidae (based on Deitz 1975, Kopp and Yonke 1979, and Deitz and Dietrich 1993).

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|                                                                                                                                                                                                                                                                                                                                                                              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Subfamily Stegaspidinae:                                                                                                                                                                                                                                                                                                                                                     |
| Tribe Microcentrini: <i>Microcentrus</i> Stål 1869 (Fig. 1).                                                                                                                                                                                                                                                                                                                 |
| Subfamily Membracinae:                                                                                                                                                                                                                                                                                                                                                       |
| Tribe Hoplophorionini: <i>Playcotis</i> Stål 1869 (Fig. 7).                                                                                                                                                                                                                                                                                                                  |
| Tribe Membracini: <i>Tylopelia</i> Fowler 1894; <i>Campylenchia</i> Stål 1869 (Fig. 4); <i>Enchenopa</i> Amyot & Serville 1843.                                                                                                                                                                                                                                              |
| Subfamily Smiliinae:                                                                                                                                                                                                                                                                                                                                                         |
| Tribe Acutalini: <i>Acutalis</i> Fairmaire 1846 (Fig. 2).                                                                                                                                                                                                                                                                                                                    |
| Tribe Microtalini: <i>Microtalis</i> Fowler 1895 (Fig. 3).                                                                                                                                                                                                                                                                                                                   |
| Tribe Ceresini: <i>Hadrophallus</i> Kopp and Yonke 1979; <i>Stictolobus</i> Metcalf 1916; <i>Tortistilus</i> Caldwell 1949; <i>Stictocephala</i> Stål 1869 (Fig. 6); <i>Spissistilus</i> Caldwell 1949.                                                                                                                                                                      |
| Tribe Amastrini: <i>Vanduzee</i> Goding 1892 (Fig. 8).                                                                                                                                                                                                                                                                                                                       |
| Tribe Smiliini: <i>Archasia</i> Stål 1867; <i>Carynota</i> Fitch 1851; <i>Glossonotus</i> Butler 1877 (Fig. 5); <i>Heliria</i> Stål 1867; <i>Telamona</i> Fitch 1851; <i>Thelia</i> Amyot and Serville 1843; <i>Atymna</i> Stål 1867; <i>Cyrtolobus</i> Goding 1892; <i>Ophiderma</i> Fairmaire 1846 (Fig. 9); <i>Smilia</i> Germar 1833; <i>Xantholobus</i> Van Duzee 1908. |
| Tribe Polyglyptini: <i>Pubilia</i> Stål 1866 (Fig. 10, right); <i>Entylia</i> Germar 1833 (Fig. 10, left).                                                                                                                                                                                                                                                                   |

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(Mecklenburg County, 29 species) reflects greater collecting effort in those areas.

With at least 89 species, North Carolina ranks third among the few states for which treehopper checklists have been published. New York ranks first (100 currently recognized species: Leonard 1928) and Ohio second (93 currently recognized species, including two presumed present based on records in neighboring states: Osborn 1940), but dubious identifications may have inflated the accuracy of counts for those states. Among treehoppers, males, females, or both may be polymorphic with respect to pronotal shape and coloration (Figs. 7, 9). Frequently, previous workers incorrectly identified a single polymorphic species as two or more distinct species.

Thirteen species previously reported from North Carolina whose occurrence in the state we could not verify and three pre-

viously misidentified species—*Hadrophallus constans* (Walker), *Spissistilus uniformis* (Fairmaire), and *Telamona concava* Fitch, are included below in square brackets.

Five additional species reported from adjacent states may eventually be found in North Carolina, but are not included in the checklist: *Palonica pyramidata* (Uhler), *Stictocephala albescens* (Van Duzee), and *Thelia uhleri* Stål, all reported from Virginia (Kopp and Yonke 1973b, 1974: distribution maps); *Helonica excelsa* (Fairmaire), reported from South Carolina (Kopp and Yonke 1974: map); and *Telamona compacta* Ball (specimen [USNM] from Rocky Bottom, South Carolina [ $<10$  miles from Transylvania County, North Carolina]).

Table 3 shows the species richness of North Carolina's treehopper fauna compared to the Nearctic Region and the world. Especially well represented in North Carolina are the genera *Cyrtolobus* (21 species), *Telamona* (10), *Ophiderma* (7), and *Heliria* (6). All species recorded are native to North Carolina and nearly all are endemic to the eastern U.S.

North Carolina treehoppers have been collected on at least 45 plant genera in 19 families, including 12 genera of Asteraceae,

Table 3. Comparison of treehopper diversity in the world, the Nearctic Region, and North Carolina (based on McKamey 1998 and the present work).

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| Geographic Area | Species | Genera | Tribes | Sub-families |
|-----------------|---------|--------|--------|--------------|
| World           | 3,177   | 397    | 49     | 12           |
| Nearctic Region | 258     | 62     | 13     | 6            |
| North Carolina  | 89      | 26     | 9      | 3            |

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9 of Fabaceae, and 3 of Fagaceae. Moreover, 39 species (43 percent of the state's membracid fauna) may be found on oaks (Fagaceae), with 16 species of *Quercus* listed below as hosts.

CHECKLIST OF NORTH CAROLINA  
MEMBRACIDAE

- Acutalis tartarea* (Say 1830) [in part as *Acutalis tartarea* var. *semicrema* (Say 1830) in Brimley 1938]. Fig. 2. Counties: Alamance, Alexander, Anson, Ashe, Beaufort, Bladen, Buncombe, Burke, Cabarrus, Caldwell, Carteret, Chatham, Davidson, Duplin, Edgecombe, Forsyth, Granville, Haywood, Henderson, Hyde, Jackson, Johnston, Mecklenburg, Nash, Onslow, Orange, Pamlico, Pasquotank, Person, Polk, Rutherford, Stanly, Surry, Tyrrell, Wake, Warren, Washington, Watauga, Wayne, Wilkes, Wilson. Seasonal distribution: 24 May–23 November. Host associations: *Ambrosia artemisiifolia*, *Arundinaria* sp., *Bidens coronata*, *Eupatorium capillifolium*, *Helianthus* sp., *Solidago* sp.
- Archasia auriculata* (Fitch 1851) [as *A. galeata* (Fabricius 1803), a preoccupied name, in Brimley 1938]. Counties: Bladen, Buncombe, Columbus, Moore, Wake. Seasonal distribution: 9 May–27 August. Host associations: *Quercus nigra*, *Q. velutina*\*.
- Archasia belfragei* Stål 1869. Counties: Bladen, Buncombe, Columbus, Henderson, Macon, Wake. Seasonal distribution: 12 May–11 September. Host associations: *Quercus alba*\*, *Q. phellos*. Notes: Brimley's (1938) record of *A. belfragei* from Southern Pines (Moore County, June), actually represents a specimen (NCDA) of *A. auriculata*.
- Atymna castaneae* (Fitch 1851) [as *Cyrtolobus castaneus* (Fitch) in Brimley 1938]. Counties: Ashe, Bladen, Buncombe, Burke, Graham, Haywood, Jackson, Sampson, Surry, Swain, Watauga, Yancey. Seasonal distribution: 23 May–31 August. Host associations: *Castanea dentata*\*, *C. pumila*\*.
- [*Atymna inornata* (Say 1830)]. Records of this species in North Carolina (Metcalf 1915, Van Duzee 1917, Brimley 1938 [as *Cyrtolobus inornata*]) were not verified by the present authors.
- Atymna querci* (Fitch 1851). Counties: Alleghany, Ashe, Buncombe, Cabarrus, Cleveland, Duplin, Forsyth, Haywood, Macon, Martin, Nash, Orange, Vance, Wake, Warren, Washington, Watauga, Wayne, Yadkin. Seasonal distribution: 14 April–8 September. Host associations: *Quercus alba*\*, *Q. stellata*\*, *Vitis rotundifolia*.
- Campylenchia latipes* (Say 1824). Fig. 4. Counties: Alamance, Alexander, Alleghany, Ashe, Avery, Bladen, Brunswick, Buncombe, Burke, Cabarrus, Caldwell, Chatham, Cleveland, Davidson, Davie, Duplin, Durham, Forsyth, Graham, Granville, Guilford, Halifax, Haywood, Johnston, Jones, Macon, Madison, Martin, McDowell, Mecklenburg, Mitchell, Montgomery, Moore, New Hanover, Onslow, Orange, Pender, Polk, Rutherford, Sampson, Scotland, Stanly, Swain, Transylvania, Wake, Warren, Washington, Watauga, Wayne, Wilkes, Yadkin. Seasonal distribution: [? 4 May (NCSU)], 3 June–21 November. Host associations: *Medicago sativa*, *Solidago* sp.
- Carynota marmorata* (Say 1830). Counties: Haywood, Henderson, Jackson, Moore, Stanly, Wake, Watauga. Seasonal distribution: 6 June–30 July. Host associations: *Betula* sp.
- Carynota mera* (Say 1830). Counties: Bladen, Currituck, Hyde, Mecklenburg, New Hanover, Pitt, Wake. Seasonal distribution: [18 May, nymphs], 21 May–late October. Host associations: *Carya illinoensis*, *C. sp.*\*
- Cyrtolobus arcuatus* (Emmons 1854). Counties: Greene, Harnett, Hertford, Wake. Seasonal distribution: 24 April–12 May. Host associations: *Quercus falcata*\*, *Q. phellos*.

- Cyrtolobus aureus* Woodruff 1924. NEW STATE RECORD. Counties: Ashe, Duplin, Guilford, Macon, Mecklenburg, Wake, Wayne. Seasonal distribution: 23 April–19–20 June. Host associations: *Quercus alba*\*, *Q. prinus*.
- Cyrtolobus celsus* Van Duzee 1917 [as *C. celsis* (sic) in Brimley 1938]. Counties: Moore. Seasonal distribution: 22 May. Host associations: no data for North Carolina.
- Cyrtolobus clarus* Woodruff 1924. NEW STATE RECORD. Counties: Wake. Seasonal distribution: 4–25 May. Host associations: *Quercus palustris*\*, *Q. phellos*\*.
- [*Cyrtolobus discoidalis* (Emmons 1854)]. Brimley's (1938) record of this species in North Carolina (Balsam, Jackson County) could not be verified, but may be the basis for Kopp and Yonke's (1973c: map) record.
- Cyrtolobus dixianus* Woodruff 1924. NEW STATE RECORD. Counties: Cabarrus, Duplin, Franklin, Wake. Seasonal distribution: 26 April–26 May. Host associations: *Quercus alba*, *Q. falcata*, *Q. palustris*, *Q. stellata*\*.
- Cyrtolobus fenestratus* (Fitch 1851). Counties: Bladen, Dare, Edgecombe, Forsyth, Greene, Hertford, Hoke, Johnston, Lenoir, Nash, Pasquotank, Robeson, Rockingham, Wake, Washington, Wilson. Seasonal distribution: [15 April, nymph], 24 April–19 May. Host associations: *Quercus falcata*\*, *Q. laevis*, *Q. margarettiae*, *Q. marilandica*\*, *Q. nigra*\*, *Q. palustris*, *Q. phellos*\*, *Q. rubra*\*, *Q. velutina*, *Q. virginiana*. Notes: Brimley's (1938) June record of *C. fenestratus* from Blowing Rock (Watauga County) was not verified by the present authors, while his July record from Blowing Rock may represent a specimen (NCDA) of *C. puritanus* Woodruff.
- Cyrtolobus flavolatus* Woodruff 1924. NEW STATE RECORD. Counties: Buncombe, Vance, Wake. Seasonal distribution: 18 May–18 June. Host associations: no data for North Carolina.
- Cyrtolobus fuliginosus* (Emmons 1854). Counties: Cabarrus, Franklin, Greene, Harnett, Hertford, Johnston, Lenoir, Martin, Mecklenburg, Pasquotank, Randolph, Wake, Warren, Washington, Wayne. Seasonal distribution: 23 April–26 May. Host associations: *Quercus coccinea*, *Q. falcata*\*, *Q. palustris*, *Q. phellos*, *Q. stellata*, *Q. velutina*\*.
- Cyrtolobus funkhouseri* Woodruff 1924. NEW STATE RECORD. Counties: Mecklenburg, Stokes, Wake, Wilkes, Yadkin. Seasonal distribution: 13 May–11 June. Host associations: *Quercus palustris*.
- Cyrtolobus fuscipennis* Van Duzee 1908. Counties: Ashe, Buncombe, Burke, Jackson, Macon, Mecklenburg, Wake. Seasonal distribution: 24 April–22 July. Host associations: *Quercus alba*\*, *Q. nigra*.
- Cyrtolobus griseus* Van Duzee 1908. NEW STATE RECORD. Counties: Ashe, Burke, Montgomery, Vance, Wake. Seasonal distribution: 29 April–6 July. Host associations: *Quercus alba*, *Q. stellata*.
- Cyrtolobus inermis* (Emmons 1854). NEW STATE RECORD. Counties: Bladen, Hoke, Rutherford, Wake. Seasonal distribution: 3 May–10 June. Host associations: *Quercus falcata*\*, *Q. marilandica*\*, *Q. stellata*.
- Cyrtolobus maculifrontis* (Emmons 1854). Counties: Ashe, Bladen, Duplin, Granville, Vance, Wake, Watauga, Wayne. Seasonal distribution: [? March (NCSU)], 23 April–27 June. Host associations: *Quercus alba*\*, *Q. falcata*.
- Cyrtolobus ovatus* Van Duzee 1908. Counties: Bladen, Hoke, Johnston, Moore, Richmond, Sampson, Wake. Seasonal distribution: 7 May–28 June. Host associations: *Quercus laevis*\*, *Q. marilandica*\*.
- Cyrtolobus pallidifrontis* (Emmons 1854). NEW STATE RECORD. Counties: Buncombe, Currituck, Wake, Warren, Watauga. Seasonal distribution: 29 April–26

- July. Host associations: *Quercus alba*, *Q. stellata*\*.
- Cyrtolobus parvulus* Woodruff 1924. NEW STATE RECORD. Counties: Bladen, Moore, Richmond. Seasonal distribution: 23 May–17 June. Host associations: no data for North Carolina. Notes: Hosts reported elsewhere include two species of *Quercus* (Kopp and Yonke 1973c).
- Cyrtolobus pulchellus* Woodruff 1924. NEW STATE RECORD. Counties: Ashe. Seasonal distribution: 19–20 June. Host associations: *Quercus rubra*.
- Cyrtolobus puritanus* Woodruff 1924. Counties: Buncombe, Wake, Watauga, Yancey [as “Black Mountains,” which is on the Buncombe–Yancey border (USNM)]. Seasonal distribution: 26 May–20 July. Host associations: no data for North Carolina. Notes: Brimley’s (1938) record of *C. puritanus* from Lake Toxoway (Transylvania Co.) was not verified by the present authors. Hosts reported elsewhere include five species of *Quercus* (Kopp and Yonke 1973c).
- [*Cyrtolobus sculptus* (Fairmaire 1846)]. Records of *C. sculptus* in North Carolina (Goding 1893, Van Duzee 1917, Brimley 1938) were not verified by the present authors.
- Cyrtolobus togatus* Woodruff 1924. NEW STATE RECORD. Counties: Buncombe, Cabarrus, Durham, Franklin, Harnett, Mecklenburg, Nash, Rockingham, Vance, Wake, Yadkin. Seasonal distribution: 23 April–23–30 June. Host associations: *Quercus nigra*\*, *Q. phellos*\*, *Q. stellata*.
- Cyrtolobus tuberosus* (Fairmaire 1846). Counties: Bladen, Cabarrus, Camden, Caswell, Columbus, Craven, Franklin, Hertford, Hoke, Lenoir, Mecklenburg, Montgomery, Nash, Northampton, Robeson, Rockingham, Wake, Warren, Wayne, Wilson. Seasonal distribution: 16 April–1 June. Host associations: *Quercus alba*\*, *Q. margarettiae*, *Q. marilandica*, *Q. nigra*, *Q. prinus*, *Q. rubra*, *Q. stellata*, *Q. virginiana*.
- Cyrtolobus vau* (Say 1830). Counties: Alleghany, Ashe, Avery, Buncombe, Caswell, Columbus, Duplin, Franklin, Haywood, Henderson, Jackson, Macon, Mecklenburg, Moore, Rockingham, Transylvania, Vance, Wake, Yancey. Seasonal distribution: late March–5 September. Host associations: *Quercus alba*\*, *Q. prinus*, *Q. stellata*.
- Enchenopa binotata* (Say 1824) complex (see Notes, below, for discussion of the complex). Counties: Alamance, Alleghany, Ashe, Buncombe, Carteret, Chatham, Gates, Graham, Guilford, Haywood, Iredell, Macon, Madison, McDowell, Moore, New Hanover, Richmond, Sampson, Stanly, Transylvania, Wake, Yancey. Seasonal distribution: [1 May, nymph], 15 May–3 October. Host associations: *Carya* sp., *Cercis canadensis*\*, *Juglans nigra*\*, *Liriodendron tulipifera*, *Robinia pseudoacacia*\*, *Viburnum prunifolium*\*. Notes: The *Enchenopa binotata* complex is thought to include nine biologically distinct North American species, each of which is associated with a different genus or species of deciduous woody host plant: (1) *Carya* spp., (2) *Celastris scandens*, (3) *Cercis canadensis*, (4) *Juglans cinerea*, (5) *J. nigra*, (6) *Liriodendron tulipifera*, (7) *Ptelea trifoliata*, (8) *Robinia pseudoacacia*, and (9) *Viburnum* spp. (Pratt and Wood 1992, 1993). Three published names are currently available for species within this complex, but the corresponding original descriptions lack host plant data as well as morphological criteria useful for distinguishing either the nymphs or adults from other species in the complex (Pratt and Wood 1992). Pratt and Wood (1992) described the fifth instar nymphs of species in the complex and provided a key for their identification, but did not attempt to resolve the nomenclatural problems.
- Based on host data, specimens examined from North Carolina appear to represent five of the nine species in the complex:

*Cercis canadensis*\*: Buncombe and Wake Counties (10 June–5 July).

*Juglans nigra*\*: Ashe and Sampson County ([23 May, nymph] 5 July).

*Liriodendron tulipifera*: Chatham County (2 July).

*Robinia pseudoacacia*\*: Macon County (5 August).

*Viburnum prunifolium*\*: Wake County (27 May).

*Entylia carinata* (Forster 1771) [in part as *E. concisa* Walker 1851, and as *E. sinuata* (Fabricius 1798) in Brimley 1938; as *E. bactriana* Germar 1835, in Kopp and Yonke 1973b; *E. carinata* (Forster) in Remes-Lenicov 1973]. Fig. 10 (left). Counties: Alamance, Alexander, Alleghany, Anson, Ashe, Avery, Beaufort, Bertie, Bladen, Buncombe, Burke, Cabarrus, Caldwell, Camden, Catawba, Chatham, Cherokee, Clay, Cleveland, Cumberland, Dare, Davidson, Davie, Duplin, Durham, Edgecombe, Gaston, Gates, Graham, Granville, Harnett, Haywood, Henderson, Hertford, Hoke, Hyde, Iredell, Jackson, Johnston, Lincoln, Macon, Madison, McDowell, Mecklenburg, Montgomery, Moore, Nash, New Hanover, Onslow, Orange, Pasquotank, Perquimans, Pitt, Polk, Rockingham, Sampson, Scotland, Stanly, Surry, Swain, Transylvania, Vance, Wake, Warren, Washington, Watauga, Wayne, Yadkin, Yancey. Seasonal distribution: 13 March–19 December. Host associations: *Ambrosia artemisiifolia*\*, *Ambrosia* sp., *Aster* sp., *Bidens bipinnata*, *B. coronata*, *B. sp.*, *Conyza canadensis* (as *Erigeron canadensis*), *Dahlia* sp., *Erechtites hieraciifolia*\*, *Erigeron* sp., *Eupatorium capillifolium*, *E. pilosum*, *E. sp.*, *Glycine max*, *Helianthus annuus*, *H. tuberosus*\*, *H. sp.*, *Quercus palustris*, *Silphium* sp., *Solanum tuberosum*, *Solidago* sp., *Verbesina alternifolia* (as *Actinomeris alternifolia*), *Vitis rotundifolia*, *V. sp.* Notes: Deitz et al. (1976) reported an *Entylia* from *Glycine max* in Columbus Co., however, the voucher ma-

terial could not be located for the present study. Also, Brimley's (1938) material from Hendersonville (Henderson County) and Willard (Pender County) could not be located and his specimen (NCDA) from "Spruce" is actually labelled "Sunburst" (Haywood County).

*Glossonotus acuminatus* (Fabricius 1775). Counties: Duplin, Wake. Seasonal distribution: 6 May–14 June. Host associations: *Quercus falcata*\*.

*Glossonotus turriculatus* (Emmons 1854). Counties: Buncombe-Yancey [as "Black Mountains," which is on the border of these counties (USNM)]. Seasonal distribution: 15–20 June. Host associations: no data for North Carolina. Notes: Hosts reported elsewhere include *Crataegus* and *Quercus* (Kopp and Yonke 1974).

*Glossonotus univittatus* (Harris 1841). Fig. 5. Counties: Bladen, Burke, Mecklenburg, Rockingham. Seasonal distribution: 16 May–4 August. Host associations: *Quercus alba*, *Q. rubra*.

*Hadrophallus borealis* (Fairmaire 1846) [as *Ceresa borealis* Fairmaire in Brimley 1938; as *Spissistilus borealis* (Fairmaire) in Kopp and Yonke 1973b]. Counties: Buncombe, Stanly, Swain, Wake, Watauga. Seasonal distribution: 3 June–29 August. Host associations: no data for North Carolina. Notes: One female specimen from Waynesville, Haywood County, 14 Sept., probably *H. borealis*—was formerly misidentified as *Ceresa constans* (Walker) by Z.P. Metcalf (NCDA). Hosts reported elsewhere include species in several plant families (Kopp and Yonke 1973b).

[*Hadrophallus constans* (Walker 1851), misidentification]. Brimley's (1938) records of *Ceresa constans* (Walker) refer to *H. borealis* (Raleigh [Wake County], Waynesville [Haywood County]), *Stictoccephala militaris* (Havelock), or *S. brevitylus* (Newton); Kopp and Yonke's (1973b: map) North Carolina record of this species (as *S. constans*) was probably based on Brimley's publication.

- Heliria cornutula* Ball 1925. NEW STATE RECORD. Counties: Bladen, Mecklenburg, Randolph, Wake. Seasonal distribution: 5 July–15 November. Host associations: no data for North Carolina.
- Heliria cristata* (Fairmaire 1846). Counties: [as “Eastern N.C.” on data label (NCSU)]. Seasonal distribution: mid July. Host associations: no data for North Carolina. Notes: Elsewhere, Kopp and Yonke (1974) reported *Quercus macrocarpa* Michx.
- Heliria genma* Ball 1925. NEW STATE RECORD. Counties: Graham. Seasonal distribution: 1 September. Host associations: no data for North Carolina.
- Heliria gibberata* Ball 1925. NEW STATE RECORD. Counties: Burke, Wake. Seasonal distribution: 23 May–late June. Host associations: no data for North Carolina. Notes: Elsewhere, Ball (1931) recorded *Celtis occidentalis* L. as a host.
- [*Heliria mexicana* Stål 1869]. Records of *H. mexicana* in North Carolina (Ball 1931, Brimley 1938) were not verified by the present authors.
- Heliria molaris* (Butler 1877). Counties: Wake, Watauga. Seasonal distribution: August. Host associations: no data for North Carolina. Notes: Elsewhere, Kopp and Yonke (1974) reported *Quercus* and *Populus* as hosts.
- Heliria scalaris* (Fairmaire 1846). Counties: Wake. Seasonal distribution: 21 June. Host associations: no data for North Carolina. Notes: Elsewhere, Kopp and Yonke (1974) reported *Crateagus* as a host.
- Microcentrus caryae* (Fitch 1851). Fig. 1. Counties: Buncombe, Forsyth, Haywood, Martin, Pitt, Sampson, Wake. Seasonal distribution: [7 May, nymph], 25 June–4 December. Host associations: *Carya illinoensis*\*, *Carya* sp.
- Microcentrus perditus* (Amyot and Serville 1843). Counties: Moore, Stokes, Wake. Seasonal distribution: 20 May–20 October. Host associations: *Carya illinoensis*.
- Microtalis calva* (Say 1830) [in part as *Microtalis calva* var. *illinoensis* (Goding 1893) in Brimley 1938]. Fig. 3. Counties: Alamance, Alexander, Alleghany, Avery, Bertie, Bladen, Brunswick, Buncombe, Cabarrus, Caswell, Chatham, Cherokee, Columbus, Cumberland, Dare, Davidson, Davie, Duplin, Durham, Forsyth, Graham, Granville, Guilford, Haywood, Hoke, Jackson, Johnston, Lincoln, Mecklenburg, Mitchell, Moore, New Hanover, Onslow, Person, Richmond, Rutherford, Scotland, Stanly, Surry, Swain, Wake, Warren, Wayne, Wilkes. Seasonal distribution: late April–2 November. Host associations: *Conyza canadensis*, *Erigeron annuus*, *Gleditsia triacanthos*\*, *Glycine max*, *Robinia pseudoacacia*, *Salix nigra*, *Solidago* sp., *Vitis rotundifolia*, *V. sp.* ‘French hybrid’. Notes: Brimley’s (1938) records from Tin City and Willard (Pender County) were not verified by the present authors.
- Microtalis dorsalis* (Fitch 1851). Counties: Alleghany, Burke, Caldwell, Haywood, Swain, Watauga, Yancey. Seasonal distribution: 11 July–21 August. Host associations: no data for North Carolina.
- Microtalis malleifera* Fowler 1895. NEW STATE RECORD. Counties: Dare. Seasonal distribution: 14 June. Host associations: *Physalis* sp. Notes: Mead (1986) reviewed information on this treehopper, the only known vector of pseudo-curly top virus (a minor disease of tomatoes).
- Ophiderma definita* Woodruff 1919. NEW STATE RECORD. Counties: Alamance, Beaufort, Bladen, Buncombe, Cabarrus, Edgecombe, Franklin, Harnett, Mecklenburg, Nash, Northampton, Pitt, Polk, Randolph, Wake, Warren, Watauga. Seasonal distribution: 23 April–16 July, [11 Sept. at UV-light (NCSU)]. Host associations: *Fagus grandifolia*, *Quercus falcata*, *Q. laurifolia*, *Q. nigra*\*, *Q. palustris*, *Q. phellos*\*.
- Ophiderma evelyna* Woodruff 1919. Fig. 9. Counties: Alamance, Bladen, Cabarrus, Greene, Harnett, Johnston, Lenoir, Mecklenburg, Montgomery, Nash, Pitt, Ran-

- dolph, Wake, Washington, Wayne, Wilson. Seasonal distribution: late March–23–30 June. Host associations: *Quercus alba*, *Q. falcata*\*, *Q. marilandica*\*, *Q. nigra*, *Q. palustris*, *Q. phellos*\*.
- Ophiderma flava* Goding 1893. Counties: Ashe, Buncombe–Haywood [as “Mt. Pisgah,” which is on the border of these counties], Macon, Watauga. Seasonal distribution: 1 June–31 August. Host associations: *Quercus alba*\*, *Q. rubra*.
- Ophiderma flavicephala* Goding 1893. Counties: Alamance, Beaufort, Buncombe, Cabarrus, Durham, Franklin, Hoke, Lenoir, Nash, Pitt, Rutherford, Wake, Wayne, Wilkes, Wilson, Yadkin. Seasonal distribution: 23 April–18 June. Host associations: *Quercus alba*, *Q. coccinea*, *Q. falcata*\*, *Q. nigra*\*, *Q. palustris*, *Q. phellos*\*, *Q. rubra* var. *ambigua* (as *borealis*), *Q. stellata*.
- Ophiderma grisea* Woodruff 1919. Counties: Buncombe, Yancey [as “Valley of Black Mountains,” which is on the Buncombe–Yancey border (USNM)]. Seasonal distribution: 18 June–9 August. Host associations: no data for North Carolina. Notes: Elsewhere, Kopp and Yonke (1973c) reported four species of *Quercus* as hosts.
- Ophiderma pubescens* (Emmons 1854) [in part as *Ophiderma flaviguttula* Goding 1893, and as *Ophiderma pubescens* var. *australis* Woodruff 1919, in Brimley 1938]. Counties: Ashe, Hoke, Jackson, Johnston, Moore, Scotland, Wake. Seasonal distribution: 24 April–26 July. Host associations: *Quercus falcata*\*, *Q. marilandica*, *Q. stellata*. Notes: Brimley’s (1938) record of *O. flaviguttata* [misidentification] from Raleigh [Wake County], May, was based on a specimen of *Cyrtolobus flavolatus* (NCDA).
- Ophiderma salamandra* Fairmaire 1846. Counties: Ashe, Burke, Greene, Harnett, Johnston, Lee, Nash, Pasquotank, Wake, Warren, Watauga, Wayne, Wilson. Seasonal distribution: 18 April–31 August. Host associations: *Quercus falcata*, *Q. nigra*, *Q. palustris*, *Q. phellos*\*, *Q. rubra*, *Q. stellata*, *Q. velutina*\*.
- Platycotis vittata* (Fabricius 1803) [as *Platycotis vittata* var. *quadrivittata* (Say 1830) in Brimley 1938]. Fig. 7. Counties: Alamance, Alexander, Alleghany, Anson, Ashe, Avery, Bladen, Buncombe, Burke, Cabarrus, Caswell, Catawba, Chatham, Cherokee, Chowan, Clay, Columbus, Craven, Cumberland, Dare, Durham, Forsyth, Franklin, Gaston, Graham, Granville, Guilford, Halifax, Haywood, Henderson, Hertford, Hoke, Iredell, Jackson, Lee, Lenoir, Lincoln, Macon, Martin, Mecklenburg, Montgomery, Moore, Nash, New Hanover, Northampton, Onslow, Pasquotank, Pitt, Randolph, Robeson, Rockingham, Sampson, Stanly, Stokes, Surry, Swain, Vance, Wake, Warren, Watauga, Wilkes, Wilson, Yadkin, Yancey. Seasonal distribution: 16 January–29 December. Host associations: *Betula* sp.\*, *Castanea dentata*\*, *Fagus* sp.\*, *Quercus alba*\*, *Q. falcata*\*, *Q. incana*\*, *Q. laevis*, *Q. margarettiae*, *Q. nigra*\*, *Q. palustris*\*, *Q. phellos*, *Q. rubra*\*, *Q. rubra* var. *ambigua*, *Q. stellata*\*, *Q. velutina*, *Q. virginiana*\*.
- Publilia concava* (Say 1824). Fig. 10 (right). Counties: Ashe, Avery, Buncombe, Burke, Cherokee, Graham, Haywood, Henderson, Jackson, Macon, Madison, McDowell, Mitchell, Swain, Watauga, Wilkes, Yadkin. Seasonal distribution: late May–7 October. Host associations: *Ambrosia artemisiifolia*\*, *A. sp.*\*, *Eupatorium* sp.\*, *Helianthus* sp.\*, *Solidago* sp.\* Notes: Brimley’s (1938) specimen from “Spruce” is actually labelled “Sunburst” (Haywood County: NCDA).
- Publilia reticulata* Van Duzee 1908. Counties: Ashe, Avery, Buncombe, Caldwell, Haywood, Henderson, Jackson, Transylvania, Wake, Watauga, Yancey (as “Black Mountains,” which is on the Buncombe–Yancey border (USNM)]. Seasonal distribution: 29 April–4 October. Host associations: no data for North

Carolina. Notes: Hosts reported elsewhere include members of the Asteraceae (Kopp and Yonke 1973b).

*Smilia camelus* (Fabricius 1803). Counties: Burke, Greene, Hoke, Mecklenburg, Moore, Pender, Robeson, Sampson, Wake, Watauga. Seasonal distribution: 24 April–25 September. Host associations: *Quercus falcata*\*, *Q. laevis*\*, *Q. nigra*\*, *Q. stellata*. Notes: Brimley's (1938) record of this species from Linville Falls [Caldwell County] was not verified by the present authors.

*Smilia fasciata* Amyot and Serville 1843. NEW STATE RECORD. Counties: Alamance, Beaufort, Cabarrus, Chatham, Craven, Davidson, Franklin, Gaston, Harnett, Johnston, Lenoir, Mecklenburg, Moore, Nash, Orange, Pasquotank, Pender, Rockingham, Wake, Warren, Wayne, Wilson. Seasonal distribution: 2 April–5 September. Host associations: *Carya illinoensis*, *Quercus coccinea*, *Q. falcata*\*, *Q. nigra*\*, *Q. palustris*\*, *Q. phellos*\*, *Q. stellata*\*, *Q. velutina*.

[*Spissistilus femoratus* (Fairmaire 1846)]. Records of this species [as *Ceresa angulata* (Walker 1851)] in North Carolina (Van Duzee 1917, Brimley 1938) were not verified by the present authors.

*Spissistilus festinus* (Say 1830) [as *Stictocephala festina* (Say) in Brimley 1938]. Counties: Alexander, Anson, Beaufort, Bertie, Bladen, Brunswick, Buncombe, Cabarrus, Caldwell, Camden, Carteret, Catawba, Chatham, Chowan, Cleveland, Columbus, Craven, Cumberland, Currituck, Dare, Davie, Duplin, Durham, Edgecombe, Franklin, Gaston, Gates, Granville, Greene, Halifax, Harnett, Haywood, Henderson, Hoke, Iredell, Jackson, Johnston, Jones, Lee, Lincoln, Madison, Martin, Mecklenburg, Mitchell, Montgomery, Moore, Nash, New Hanover, Onslow, Orange, Pamlico, Pasquotank, Pender, Perquimans, Polk, Randolph, Robeson, Rockingham, Rowan, Sampson, Scotland, Stanly, Swain, Transylvania, Tyrrell, Union, Vance, Wake, War-

ren, Washington, Wayne, Wilkes, Wilson. Seasonal distribution: 19 February–19 December. Host associations: *Arachis hypogaea*\*, *Aster ericoides*, *Glycine max*\*, *Helianthus* sp., *Lespedeza* sp.\*, *Medicago sativa*\*, *Phaseolus vulgaris*\*, *Sarracenia flava*, *Solidago* sp. Notes: This species is commonly known as the "three-cornered alfalfa hopper." Hargrove's (1986) record of *S. festinus* from Coweeta, Macon County (on *Robinia pseudoacacia*), was not verified by the present authors.

[*Spissistilus rotundata* Stål 1869]. Brimley's (1938) records of *Stictocephala rotundata* Stål in North Carolina (Raleigh [Wake County] and Southern Pines [Moore County]) were not verified by the present authors.

[*Spissistilus uniformis* (Fairmaire 1846), misidentification]. Brimley's (1938) records of *Ceresa uniformis* Fairmaire actually refer to *Hadrophallus borealis*; these include one female in NCDA from Balsam [Jackson County], 14–18 September.

*Stictocephala bisonia* Kopp and Yonke 1977 [as *Ceresa bubalus* (Fabricius 1794), misidentification, in Brimley 1938; as *Stictocephala bubalus* (Fabricius), misidentification, in Kopp and Yonke 1973b; *Stictocephala bisonia* Kopp and Yonke 1977 (Kopp and Yonke 1977); as *S. alta* (Walker 1851) in Andrade 1997 (questionable synonymy, see "Notes," below)]. Counties: Alleghany, Ashe, Avery, Beaufort, Buncombe, Haywood, Madison, Mitchell, Montgomery, Stanly, Surry, Wake, Warren, Watauga. Seasonal distribution: 16 July–30 September. Host associations: *Glycine max*. Notes: This species is commonly known as the "buffalo treehopper." Recently, Andrade (1997) considered *S. bisonia* to be a junior synonym of *S. alta* (Walker 1851). We believe this synonymy is insufficiently justified in light of the need to examine the male genitalia to reliably identify many species of the tribe Cere-

- sini. The holotype of *Ceresa alta* Walker is of ambiguous identity, being a female specimen from an unspecified locality. On the other hand, the identity of the male holotype of *S. bisonia* Kopp and Yonke is definitive, and this type is accompanied by 45 paratypes (males and females), all from Columbia, Missouri, USA.
- [*Stictocephala brevicornis* (Fitch 1856)]. Records of this species in North Carolina were not verified by the present authors. Brimley's (1938) record of *Ceresa brevicornis* Fitch (Swannanoa, Buncombe County, May) probably referred to *Stictocephala brevitylus* (Van Duzee); Kopp and Yonke's (1973b: map) record may be based on Brimley's publication. Hargrove (1986) also listed this treehopper from Coweeta, Macon County, on *Robinia pseudoacacia*.
- [*Stictocephala brevis* (Walker 1851)]. Notes: Brimley's (1938) record of this species in North Carolina (as *Ceresa brevis* Walker) has not been verified by the present authors. One specimen (Swannanoa, Buncombe County, 21 May: NCDA) identified as *Ceresa brevis* Walker by Brimley is actually *Stictocephala brevitylus*, however. Brimley's published record gave no locality or date.
- Stictocephala brevitylus* (Van Duzee 1908) [as *Ceresa brevitylus* Van Duzee in Brimley 1938]. Counties: Alleghany, Anson, Avery, Brunswick, Buncombe, Cabarrus, Caswell, Catawba, Chatham, Cumberland, Currituck, Dare, Durham, Forsyth, Granville, Harnett, Haywood, Henderson, Hertford, Jackson, McDowell, Mecklenburg, Moore, New Hanover, Pasquotank, Randolph, Stanly, Swain, Wake, Washington, Watauga, Wilkes, Yadkin, Yancey. Seasonal distribution: 5 April–2 July. Host associations: *Aster* sp., *Ceanothus* sp., *Chrysanthemum leucanthemum*, *Helianthus* sp.\*, *Morus* sp., *Quercus falcata*, *Robinia pseudoacacia*, *Rubus argutus*\*, *Sarracenia flava*, *Smilax* sp.\*, *Solanum tuberosum*, *Vaccinium* sp. (as *Polycodium* sp.), *Vitis* sp. 'French hybrid'.
- Stictocephala diceros* (Say 1824) [as *Ceresa diceros* (Say) in Brimley 1938]. Counties: Ashe, Buncombe, Cabarrus, Caldwell, Durham, Granville, Haywood, Iredell, McDowell, Mecklenburg, Wake, Watauga. Seasonal distribution: 8 June–6 October. Host associations: *Sambucus canadensis*.
- [*Stictocephala diminuta* Van Duzee 1908]. North Carolina records of this species were not verified by the present authors. Brimley's (1938) record of *S. diminuta* in Raleigh [Wake County], July, probably represents *S. brevitylus*.
- Stictocephala lutea* (Walker 1851). Counties: Alleghany, Avery, Bladen, Brunswick, Buncombe, Burke, Carteret, Caswell, Chatham, Cumberland, Duplin, Haywood, Hoke, Jackson, Johnston, Madison, Mecklenburg, Moore, New Hanover, Onslow, Pender, Sampson, Scotland, Stanly, Transylvania, Vance, Wake, Washington, Watauga. Seasonal distribution: 24 February–16 September. Host associations: *Quercus falcata* (suckers).
- Stictocephala militaris* (Gibson and Wells 1917). NEW STATE RECORD. Fig. 6. Counties: Bladen, Craven, Hyde, Johnston, Mecklenburg, Pitt, Wake. Seasonal distribution: 19 June–16 October. Host associations: *Cercis canadensis*, *Prunus serotina*.
- Stictocephala palmeri* (Van Duzee 1908) [as *Ceresa palmeri* Van Duzee in Brimley 1938]. Counties: Avery-Caldwell-Watauga [as "Grandfather Mountain," which is on the border of these three counties (NCSU)], Buncombe, Graham, Macon, McDowell-Yancey [as "Buck Creek Gap," which is on the border of these counties (NCSU)], Stanly, Wake. Seasonal distribution: 21 July–29 September. Host associations: no data for North Carolina. Notes: Elsewhere, *Carya* is the oviposition host (Funkhouser

- 1917)—feeding occurs also on other woody hosts (Kopp and Yonke 1973b).
- Stictocephala stimulea* (Van Duzee 1914). NEW STATE RECORD. Counties: Cabarrus, Pender, Wake. Seasonal distribution: 1–31 May. Host associations: *Vitis* prob. *vulpina* [ovipositing in canes].
- [*Stictocephala substriata* (Walker 1851)]. Brimley's (1938) records of this species in North Carolina (Raleigh [Wake County] and Southern Pines [Moore County]) were not verified by the present authors.
- Stictocephala taurina* (Fitch 1856) [as *Ceresa taurina* (Fitch) in Brimley 1938]. Counties: Ashe, Avery, Buncombe, Forsyth, Madison, Mitchell, Surry, Wake, Watauga. Seasonal distribution: 19–20 June–18 September. Host associations: *Helianthus* sp., *Rubus* sp., *Sambucus canadensis*, *Smilax* sp.\*
- Stictocephala tauriniformis* Caldwell 1949. NEW STATE RECORD. Counties: Haywood. Seasonal distribution: 14 September. Host associations: no data for North Carolina. Notes: Elsewhere, Kopp and Yonke (1973b) reported *Quercus* and *Tilia* as hosts.
- Stictolobus minutus* (Funkhouser 1915) [as *Stictolobus subulatus* (Say 1830) in Brimley 1938 and Kopp and Yonke 1973b]. Counties: Pender, Wake. Seasonal distribution: early July. Host associations: no data for North Carolina. Notes: Elsewhere, Kopp and Yonke (1973b) reported *Taxodium distichum* (L.) L. Richard as a host.
- Telamona ampelopsidis* (Harris 1841). Counties: unknown, as "NC" on data label (USNM). Seasonal distribution: unknown. Host associations: no data for North Carolina. Notes: Early reports of this species in North Carolina (Ball 1931; Brimley 1938) apparently refer to *T. maculata* Van Duzee, based on a specimen misidentified by C. S. Brimley as *T. ampelopsidis* (NCDA). Kopp and Yonke (1974: map), who also reported the species in North Carolina, listed its host as *Parthenocissus quinquefolia* (L.) Planchon.
- Telamona collina* (Walker 1851). NEW STATE RECORD. Counties: Wake. Seasonal distribution: 18–22 May. Host associations: *Platanus occidentalis*.
- [*Telamona concava* Fitch 1851, misidentification]. Records of *Telamona concava* from Linville Falls (Caldwell County, June 1920: NCDA) (Brimley 1942, Wray 1967), actually refer to *Heliria gibberata*.
- Telamona decorata* Ball 1903. NEW STATE RECORD. Counties: Ashe, Henderson, Watauga. Seasonal distribution: 19–20 June–13 September. Host associations: *Castanea dentata*, *Quercus alba*, *Q. rubra*.
- Telamona dubiosa* Van Duzee 1916. NEW STATE RECORD. Counties: Bladen. Seasonal distribution: 21 September–11 October. Host associations: no data for North Carolina. Funkhouser (1917) listed *Quercus alba* as a host.
- Telamona extrema* Ball 1903. NEW STATE RECORD. Counties: Carteret, Wake, Yadkin. Seasonal distribution: 13–29 May. Host associations: no data for North Carolina. Notes: Hosts reported elsewhere include two species of *Quercus* (Kopp and Yonke 1974).
- Telamona maculata* Van Duzee 1908. NEW STATE RECORD. Counties: Ashe, Wake. Seasonal distribution: 10 May–18 July. Host associations: no data for North Carolina. Notes: Hosts elsewhere include three species of *Quercus* (Kopp and Yonke 1974).
- Telamona monticola* (Fabricius 1803). Counties: Ashe, Avery, Buncombe, Burke, Caldwell, Columbus, Hoke, Johnston, Macon, Robeson, Surry, Vance, Wake, Watauga. Seasonal distribution: 20 April–18 October. Host associations: *Quercus falcata*, *Q. margarettiae*, *Q. nigra*\*, *Q. rubra*\*, *Q. stellata*, *Vitis rotundifolia*.
- Telamona reclinata* Fitch 1851. Counties: Ashe, Buncombe, Macon, Mecklenburg,

- Wake. Seasonal distribution: 2 June–31 August. Host associations: *Quercus alba*. [*Telamona salvini* Distant 1879]. Records (Ball 1931, Brimley 1938) of *T. salvini* in North Carolina (Black Mountains) were not verified by the present authors, but the species is known to occur in Charleston County, South Carolina (NCSU, 1 specimen).
- [*Telamona tiliae* Ball 1925]. Records of *T. tiliae* in "North Carolina" (Ball 1931, Brimley 1938) seem to be based, at least in part, on a specimen (Blowing Rock [Watauga County], 13 Sept., NCDA) identified by C. S. Brimley as *T. tiliae* which is actually *T. decorata*. Presence of this species in North Carolina remains unconfirmed.
- Telamona unicolor* Fitch 1851. Counties: Bertie, Bladen, Buncombe–Yancey [as "Black Mountains" which is on the Buncombe–Yancey border], Columbus, Hoke, Macon, Mecklenburg, Wake. Seasonal distribution: 29 April–27 October. Host associations: *Carya illinoensis*\*, *C. sp.*\*
- Telamona westcotti* Goding 1893. Counties: Henderson, Union. Seasonal distribution: 25–30 June–5 September. Host associations: no data for North Carolina. Notes: Hosts reported elsewhere include *Quercus*, *Tilia*, and *Ulmus* (Kopp and Yonke 1974).
- Thelia bimaculata* (Fabricius 1794). Counties: Alexander, Ashe, Avery, Buncombe, Graham, Haywood, Jackson, Lincoln, Macon, McDowell, Mecklenburg, Swain, Wake, Watauga. Seasonal distribution: 10 June–19 October. Host associations: *Robinia pseudoacacia*\*.
- Tortistilus abnormus* (Caldwell 1949). NEW STATE RECORD. Counties: Durham, Stanly. Seasonal distribution: 13–21 July. Host associations: no data for North Carolina.
- [*Tortistilus inermis* (Fabricius 1775)]. Brimley's (1938) record of *T. inermis* (as *Stictocephala inermis*) in North Carolina was not verified by the present authors, but the species has also been recorded from two adjoining states, Virginia and Tennessee (Kopp and Yonke 1973b).
- Tortistilus lateralis* (Funkhouser 1936). NEW STATE RECORD. Counties: Bladen. Seasonal distribution: 8–22 September. Host associations: no data for North Carolina.
- Tylopetta gibbera* (Stål 1869) [as *Tylopetta brevis* Van Duzee 1908, in Brimley 1938; as *Tylopetta americana* (Goding 1893) in Kopp and Yonke 1973a]. Counties: Buncombe, Haywood, New Hanover, Swain, Wake. Seasonal distribution: 16 April–27 September. Host associations: *Desmodium* sp.
- Vanduzee arquata* (Say 1830) [as *V. arcuata* (sic) in Brimley 1938]. Fig. 8. Counties: Alamance, Alexander, Alleghany, Ashe, Avery, Bladen, Buncombe, Caldwell, Caswell, Catawba, Chatham, Cherokee, Clay, Durham, Forsyth, Graham, Haywood, Jackson, Lincoln, Macon, Madison, Mecklenburg, Mitchell, Orange, Polk, Richmond, Rockingham, Sampson, Surry, Swain, Union, Wake, Watauga, Wilkes, Yancey. Seasonal distribution: [? late March (NCSU)], 9 May–27 October. Host associations: *Robinia pseudoacacia*\*.
- Vanduzeea triguttata* (Burmeister 1836). Counties: Hoke, Johnston, Lee, Moore, New Hanover, Pender, Stanly, Wake. Seasonal distribution: 17 June–27 September. Host associations: *Lespedeza* sp.\*
- Xantholobus intermedius* (Emmons 1854). Counties: Ashe, Buncombe–Yancey [as "Valley of Black Mountains," which is on the Buncombe–Yancey border (USNM)], Wake. Seasonal distribution: 4 May–7 July. Host associations: *Betula alleghaniensis* (as *B. lutea*), *Quercus phellos*\*.
- Xantholobus lateralis* (Van Duzee 1908) [as *Cyrtolobus lateralis* Van Duzee in Brimley 1938]. Counties: Ashe, Burke, Caldwell, Lee, Mecklenburg, Watauga. Seasonal distribution: 3 May–6 July. Host associations: *Betula* sp., *Quercus alba*.
- Xantholobus muticus* (Fabricius 1777) [as

*Cyrtolobus muticus* (Fabricius) in Brimley 1938]. Counties: Camden, Chatham, Duplin, Forsyth, Franklin, Gates, Greene, Hertford, Lee, Moore, Nash, Northampton, Randolph, Rutherford, Wake, Warren, Wayne, Wilson. Seasonal distribution: 18 April–14 July. Host associations: *Quercus alba*\*, *Q. laevis*, *Q. prinus*, *Q. stellata*\*.

*Xantholobus nitidus* (Van Duzee 1908). Counties: Bladen, Forsyth, Johnston, Moore, Sampson, Wake, Wilkes. Seasonal distribution: 17 May–19 June. Host associations: no data for North Carolina.

#### HOST PLANT INDEX FOR NORTH CAROLINA TREEHOPPERS

*Plant scientific name, common name(s)*  
(Family): associated treehopper species.

*Ambrosia artemisiifolia* L., ragweed (Asteraceae): *Acutalis tartarea*, *Entylia carinata*\*, *Publilia concava*\*.

*Ambrosia* sp., ragweed (Asteraceae): *Entylia carinata*, *Publilia concava*\*.

*Arachis hypogaea* L., peanut, common peanut, goober, groundnut, grass nut, earth nut, monkey nut, pindar (Fabaceae): *Spissistilus festinus*\*.

*Arundinaria* sp., bamboo, cane (Poaceae): *Acutalis tartarea*.

*Aster ericoides* L., heath aster (Asteraceae): *Spissistilus festinus*.

*Aster* sp., aster, Michaelmas daisy, starwort, frost flower (Asteraceae): *Entylia carinata*, *Stictocephala brevitylus*.

*Betula alleghaniensis* Britton, yellow birch, gray birch (Betulaceae): *Xantholobus intermedius*.

*Betula* sp., birch (Betulaceae): *Carynota marmorata*, *Platycotis vittata*\*, *Xantholobus lateralis*.

*Bidens bipinnata* L., Spanish needles (Asteraceae): *Entylia carinata*.

*Bidens coronata* (L.) Britton, beggar ticks, beggar's ticks (Asteraceae): *Acutalis tartarea*, *Entylia carinata*.

*Bidens* sp., beggar ticks, beggar's ticks, bur marigold, water marigold, pitchforks,

Spanish needles, stick-tights, tickseed (Asteraceae): *Entylia carinata*.

*Carya illinoensis* (Wangenh.) K. Koch, pecan (Juglandaceae): *Carynota mera*, *Microcentrus caryae*\*, *M. perditus*, *Smilia fasciata*, *Telamona unicolor*\*.

*Carya* sp., hickory (Juglandaceae): *Carynota mera*\*, *Enchenopa binotata* complex, *Microcentrus caryae*, *Telamona unicolor*\*.

*Castanea dentata* (Marshall) Borkh., American chestnut (Fagaceae): *Atymna castaneae*\*, *Platycotis vittata*\*, *Telamona decorata*.

*Castanea pumila* (L.) P. Miller, chinquapin (Fagaceae): *Atymna castaneae*\*.

*Ceanothus* sp., redroot (Rhamnaceae): *Stictocephala brevitylus*.

*Cercis canadensis* L., eastern redbud, redbud, Judas tree (Fabaceae): *Enchenopa binotata* complex\*, *Stictocephala militaris*.

*Chrysanthemum leucanthemum* L., ox-eye daisy, white daisy, marguerite, white-weed (Asteraceae): *Stictocephala brevitylus*.

*Conyza canadensis* (L.) Cronquist, horseweed, hogweed, butterweed (Asteraceae): *Entylia carinata*, *Micrualis calva*.

*Dahlia* sp., dahlia (Asteraceae): *Entylia carinata*.

*Desmodium* sp., beggar lice, beggar ticks, beggar's ticks, tick trefoil, tick clover (Fabaceae): *Tylopelta gibbera*.

*Erechtites hieraciifolia* (L.) Raf. ex DC., fireweed (Ranunculaceae): *Entylia carinata*\*.

*Erigeron annuus* (L.) Persoon, daisy fleabane, sweet scabious, white-top, fleabane (Asteraceae): *Micrualis calva*.

*Erigeron* sp., fleabane (Asteraceae): *Entylia carinata*.

*Eupatorium capillifolium* (Lam.) Small, dog-fennel (Asteraceae): *Acutalis tartarea*, *Entylia carinata*.

*Eupatorium pilosum* Walter, thoroughwort, boneset (Asteraceae): *Entylia carinata*.

*Eupatorium* sp., thoroughwort, boneset

- (Asteraceae): *Entylia carinata*, *Publilia concava*\*.
- Fagus grandifolia* J. F. Ehrhart, beech, American beech (Fagaceae): *Ophiderma definita*.
- Fagus* sp., beech (Fagaceae): *Microcentrus caryae*, *Platycotis vittata*.
- Gleditsia triacanthos* L., honey locust, sweet locust, honeyshuck (Fabaceae): *Micrualis calva*\*.
- Glycine max* (L.) Merrill, soybean, soja bean, soya bean (Fabaceae): *Entylia carinata*, *Micrualis calva*, *Spissistilus festinus*\*, *Stictocephala alta*.
- Helianthus annuus* L., sunflower, common sunflower, mirasol (Asteraceae): *Entylia carinata*.
- Helianthus* sp., sunflower (Asteraceae): *Acutalis tartarea*, *Entylia carinata*, *Publilia concava*, *Spissistilus festinus*, *Stictocephala brevitylus*\*, *S. taurina*.
- Helianthus tuberosus* L., Jerusalem artichoke, girasole (Asteraceae): *Entylia carinata*\*.
- Juglans nigra* L., black walnut (Juglandaceae): *Enchenopa binotata* complex\*.
- Lespedeza* sp., bush clover (Fabaceae): *Spissistilus festinus*\*, *Vanduzeeia triguttata*\*.
- Liriodendron tulipifera* L., tulip tree, tulip poplar, whitewood, yellow poplar (Magnoliaceae): *Enchenopa binotata* complex.
- Medicago sativa* L., alfalfa, lucerne (Fabaceae): *Campylenchia latipes*, *Spissistilus festinus*\*.
- Morus* sp., mulberry (Moraceae): *Stictocephala brevitylus*.
- Phaseolus vulgaris* L., common bean, kidney bean, green bean, snap bean, haricot, French bean, frijol, runner bean, string bean, salad bean, wax bean (Fabaceae): *Spissistilus festinus*\*.
- Physalis* sp., ground cherry (Solanaceae): *Micrualis malleifera*.
- Platanus occidentalis* L., eastern sycamore, sycamore, button wood, buttonball, American plane-(Platanaceae): *Telamona collina*.
- Prunus serotina* J. F. Ehrhart, black cherry, wild black cherry, rum cherry, (Rosaceae): *Stictocephala militaris*.
- Quercus alba* L., white oak (Fagaceae): *Archasia auriculata*\*, *A. belfragei*\*, *Atymna querci*\*, *Cyrtolobus aureus*\*, *C. dixianus*, *C. fuscipennis*\*, *Cyrtolobus griseus*, *C. maculifrons*\*, *C. pallidifrons*, *C. tuberosus*\*, *C. vau*\*, *Glossonotus univittatus*, *Ophiderma evelyna*, *O. flava*\*, *O. flavicephala*, *Platycotis vittata*\*, *Telamona decorata*, *T. reclinata*, *Xantholobus lateralis*, *X. muticus*\*.
- Quercus coccinea* Muenchh., scarlet oak (Fagaceae): *Cyrtolobus fuliginosus*, *Ophiderma flavicephala*, *Smilia fasciata*.
- Quercus falcata* Michaux, southern red oak, Spanish oak, Spanish red oak (Fagaceae): *Stictocephala lutea*, *Telamona monticola*, *Cyrtolobus arcuatus*\*, *C. dixianus*, *C. fenestratus*\*, *C. fuliginosus*\*, *C. inermis*\*, *C. maculifrons*, *Glossonotus acuminatus*\*, *Ophiderma definita*, *O. evelyna*\*, *O. flavicephala*\*, *O. pubescens*\*, *O. salamandra*, *Platycotis vittata*\*, *Smilia camelus*\*, *S. fasciata*\*, *Stictocephala brevitylus*, *S. lutea*, *Telamona monticola*.
- Quercus incana* Bartram, bluejack oak, upland willow oak, bluejack, turkey oak, high-ground willow oak, sand jack (Fagaceae): *Platycotis vittata*\*.
- Quercus laevis* Walter, turkey oak, Catesby oak (Fagaceae): *Cyrtolobus fenestratus*, *C. ovatus*\*, *Platycotis vittata*, *Smilia camelus*\*, *Xantholobus muticus*.
- Quercus laurifolia* Michaux, laurel oak, Darlington oak, laurel-leaved oak (Fagaceae): *Ophiderma definita*.
- Quercus margarettiae* Ashe ex Small, scrubby post oak (Fagaceae): *Cyrtolobus fenestratus*, *C. tuberosus*, *Telamona monticola*, *Platycotis vittata*.
- Quercus marilandica* Muenchh., blackjack oak, blackjack, jack oak (Fagaceae): *Cyrtolobus fenestratus*\*, *C. inermis*, *C. ovatus*\*, *C. tuberosus*, *Ophiderma evelyna*\*, *O. pubescens*.
- Quercus nigra* L., water oak, possum oak (Fagaceae): *Archasia auriculata*, *Cyrtolobus fenestratus*\*, *C. fuscipennis*, *C. toga*

- tus\**, *C. tuberosus*, *Ophiderma definita\**, *O. evelyna*, *O. flavicephala\**, *O. salamandra*, *Platycotis vittata\**, *Smilia camelus\**, *S. fasciata\**, *Telamona monticola\**.
- Quercus palustris* Muenchh., pin oak, Spanish oak (Fagaceae): *Cyrtolobus clarus\**, *C. dixianus*, *C. fenestratus*, *C. fuliginosus*, *C. funkhouseri*, *Entylia carinata*, *Ophiderma definita*, *O. evelyna*, *O. flavicephala*, *O. salamandra*, *Platycotis vittata*, *Smilia fasciata\**.
- Quercus phellos* L., willow oak (Fagaceae): *Archasia belfragei*, *Cyrtolobus arcuatus*, *C. clarus\**, *C. fenestratus\**, *C. fuliginosus*, *C. togatus\**, *Ophiderma definita\**, *O. evelyna\**, *O. flavicephala\**, *O. salamandra\**, *Platycotis vittata*, *Smilia camelus*, *S. fasciata\**, *Xantholobus intermedius\**.
- Quercus prinus* L., chestnut oak, rock chestnut oak, basket oak (Fagaceae): *Cyrtolobus aureus*, *C. tuberosus*, *C. vau*, *Xantholobus muticus*.
- Quercus rubra* L. (see also var. *ambigua*, gray oak or northern red oak, below), red oak (Fagaceae): *Cyrtolobus fenestratus\**, *C. pulchellus*, *C. togatus*, *Glossonotus univittatus*, *Ophiderma flava*, *O. salamandra*, *Platycotis vittata\**, *Telamona decorata*, *T. monticola*.
- Quercus rubra* var. *ambigua* (Gray) Fern., gray oak, northern red oak (Fagaceae): *Ophiderma flavicephala*, *Platycotis vittata*.
- Quercus stellata* Wangenh., post oak (Fagaceae): *Atymna querci\**, *Cyrtolobus dixianus\**, *C. fuliginosus*, *C. griseus*, *C. inermis*, *C. pallidifrontis\**, *C. togatus*, *C. tuberosus*, *C. vau*, *Ophiderma flavicephala*, *O. pubescens*, *O. salamandra*, *Platycotis vittata\**, *Smilia camelus*, *S. fasciata\**, *Telamona monticola*, *Xantholobus muticus\**.
- Quercus velutina* Lam., black oak, yellow-bark oak, quercitron (Fagaceae): *Archasia auriculata\**, *Cyrtolobus fenestratus*, *C. fuliginosus*, *Ophiderma salamandra\**, *Platycotis vittata*, *Smilia fasciata*.
- Quercus virginiana* P. Miller, live oak, southern live oak (Fagaceae): *Cyrtolobus fenestratus*, *C. tuberosus*, *Platycotis vittata\**.
- Robinia pseudoacacia* L., black locust, false acacia, yellow locust (Fabaceae): *Enchenopa binotata* complex\*, *Microtalis calva*, *Stictocephala brevitylus*, *Thelia bimaculata\**, *Vanduzee arquata\**.
- Rubus argutus* Link, blackberry (Rosaceae): *Stictocephala brevitylus\**.
- Rubus* sp., bramble (Rosaceae): *Stictocephala taurina*.
- Salix nigra* Marshall, black willow (Salicaceae): *Microtalis calva*.
- Sambucus canadensis* L., elderberry, American elderberry, sweet elderberry, (Caprifoliaceae): *Stictocephala diceros*, *S. taurina*.
- Sarracenia flava* L., yellow pitcher plant, trumpets, watches, biscuit-flower, trumpetleaf, umbrella-trumpets, huntsman's horn (Sarraceniaceae): *Spissistilus festinus*, *Stictocephala brevitylus*.
- Silphium* sp., rosinweed (Asteraceae): *Entylia carinata*.
- Smilax* sp., greenbrier, catbrier (Liliaceae): *Stictocephala brevitylus\**, *S. taurina\**.
- Solanum tuberosum* L., potato, Irish potato, white potato (Solanaceae): *Entylia carinata*, *Stictocephala brevitylus*.
- Solidago* sp., goldenrod (Asteraceae): *Acutalis tartarea*, *Campylenchia latipes*, *Entylia carinata*, *Microtalis calva*, *Publilia concava\**, *Spissistilus festinus*.
- Vaccinium* sp., blueberry, huckleberry, cranberry, bilberry (Ericaceae): *Stictocephala brevitylus*.
- Verbesina alternifolia* (L.) Britton ex Kearney, wingstem, yellow ironweed (Asteraceae): *Entylia carinata*.
- Viburnum prunifolium* L., black haw, sweet haw, sheepberry, nanny-berry, stagbush (Caprifoliaceae): *Enchenopa binotata* complex.
- Vitis rotundifolia* Michaux, muscadine grape, scuppernong grape, bullace grape (Vitaceae): *Atymna querci*, *Entylia carinata*, *Microtalis calva*, *Telamona monticola*.
- Vitis* sp., grape (Vitaceae): *Entylia carinata*.

*Vitis* sp. 'French hybrid,' grape 'French hybrid' (Vitaceae): *Micrutalis calva*, *Stictocephala brevitylus*.  
*Vitis* prob. *vulpina* L., frost grape, winter grape, chicken grape (Vitaceae): *Stictocephala stimulea*.

ACKNOWLEDGMENTS

The authors are grateful to the following individuals: for collecting treehoppers listed in this work—J. R. Baker, C. H. Bartlett, R. L. Blinn, B. K. Cassel, P. J. Crawford, J. R. Cryan, B. A. Harrison, H. H. Neunzig, W. L. Nicholson, R. L. Regnery, D. L. Stephan, S. J. Toth, Jr., J. D. Trexler, M. S. Wallace, and B. M. Wiegmann; for preparing many specimens for the North Carolina State University Insect Collection—M. P. Sobanski; for allowing us to examine specimens in their care—S. E. Halbert and F. W. Mead (FSCA); K. R. Ahlstrom (NCDA); R. L. Blinn (NCSU); and T. J. Henry, S. H. McKamey, Systematic Entomology Laboratory, USDA, and R. C. Froeschner, Smithsonian Institution (USNM); for assistance with plant identifications and botanical nomenclature—J. W. Floyd and J. W. Hardin (Department of Botany, North Carolina State University); and for helpful comments on manuscript—R. L. Blinn, J. R. Cryan, W. F. Gimpel, Jr., S. H. McKamey, H. H. Neunzig, D. J. Voegtlin, B. M. Wiegmann, and D. W. Webb. Y. W. Chan and S. J. Toth, Jr., assisted in the preparation of Fig. 11; photographs are by C. H. Dietrich, except Fig. 2, which is by R. L. Blinn. This research was supported by the North Carolina Agricultural Research Service and NSF grant DEB-9726282.

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